

(12) UK Patent Application (19) GB (11) 2 362 615 (13) A

(43) Date of A Publication 28.11.2001

(21) Application No 0012320.8

(22) Date of Filing 23.05.2000

(71) Applicant(s)
Corus UK Limited
(Incorporated in the United Kingdom)
15 Great Marlborough Street, LONDON, W1F 7AS,
United Kingdom

(72) Inventor(s)
Michael John Baldwin

(74) Agent and/or Address for Service
Fry Heath & Spence
The Old College, 53 High Street, HORLEY, Surrey,
RH6 7BN, United Kingdom

(51) INT CL⁷
B60R 21/34 // B62D 25/12

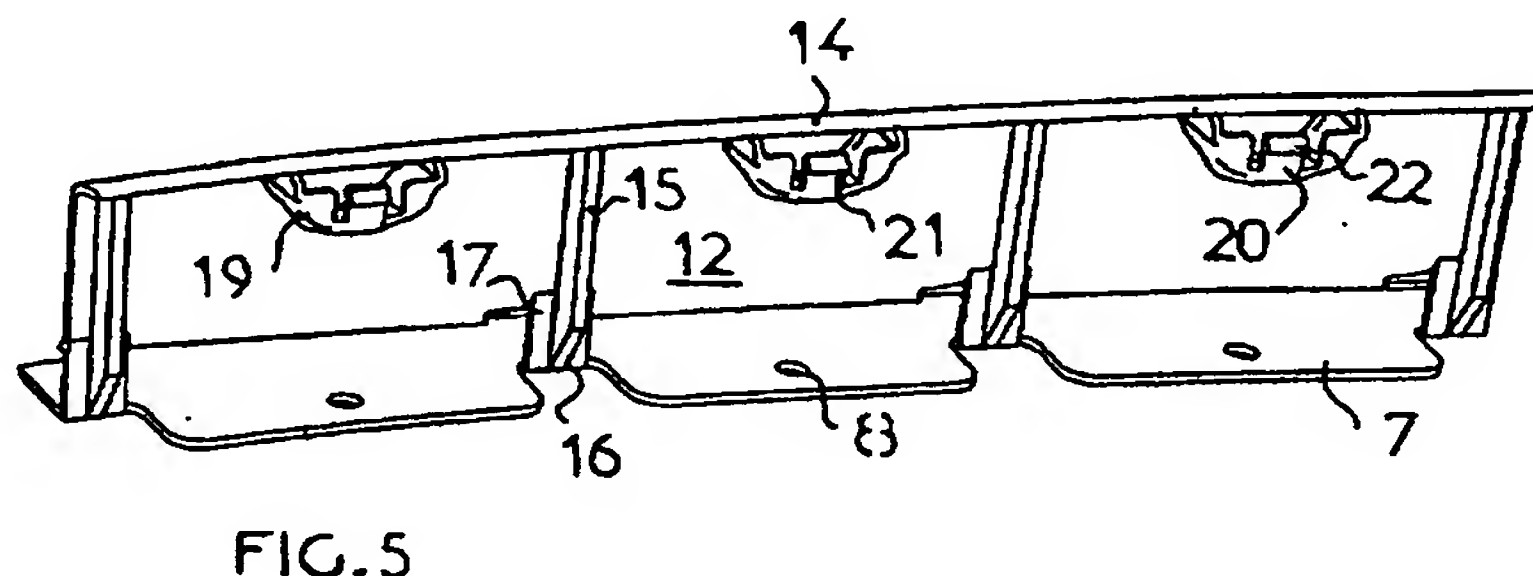
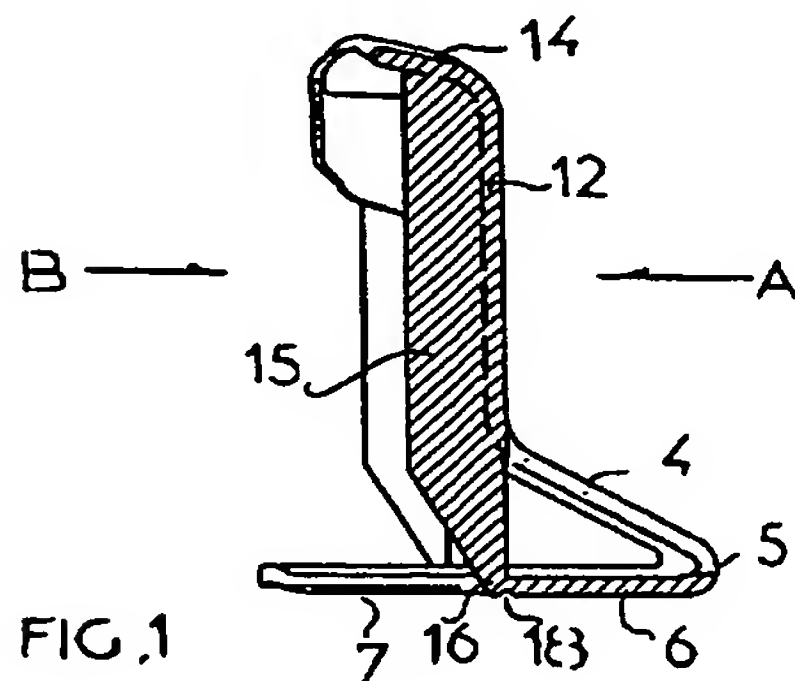
(52) UK CL (Edition S)
B7B BSES

(56) Documents Cited
EP 0838389 A1 EP 0641707 A2 US 5667271 A

(58) Field of Search
UK CL (Edition S) **B7B BCM BSC BSEA BSEM BSES**
INT CL⁷ **B60R 21/34 , B62D 25/08 25/10 25/12 25/16**
Online WPI, EPODOC, JAPIO

(54) Abstract Title
A collapsible fixing for attaching a vehicle fender, wing or bonnet to a vehicle body

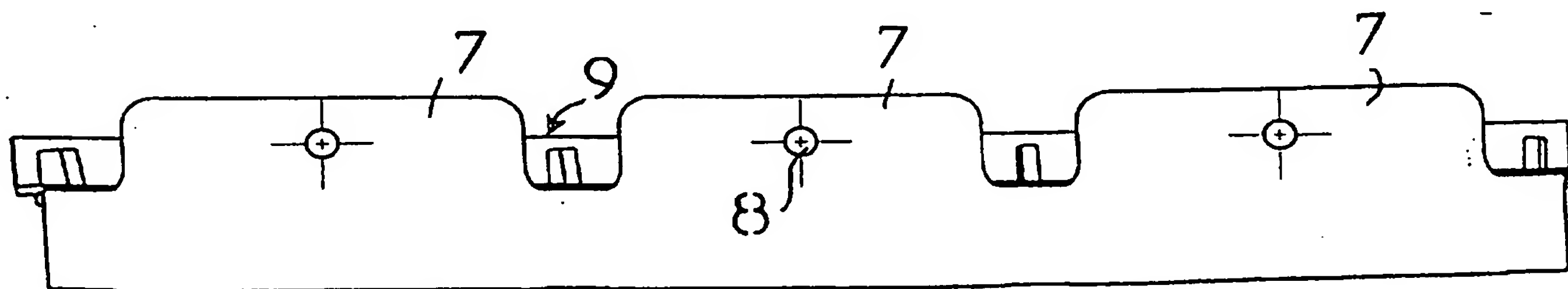
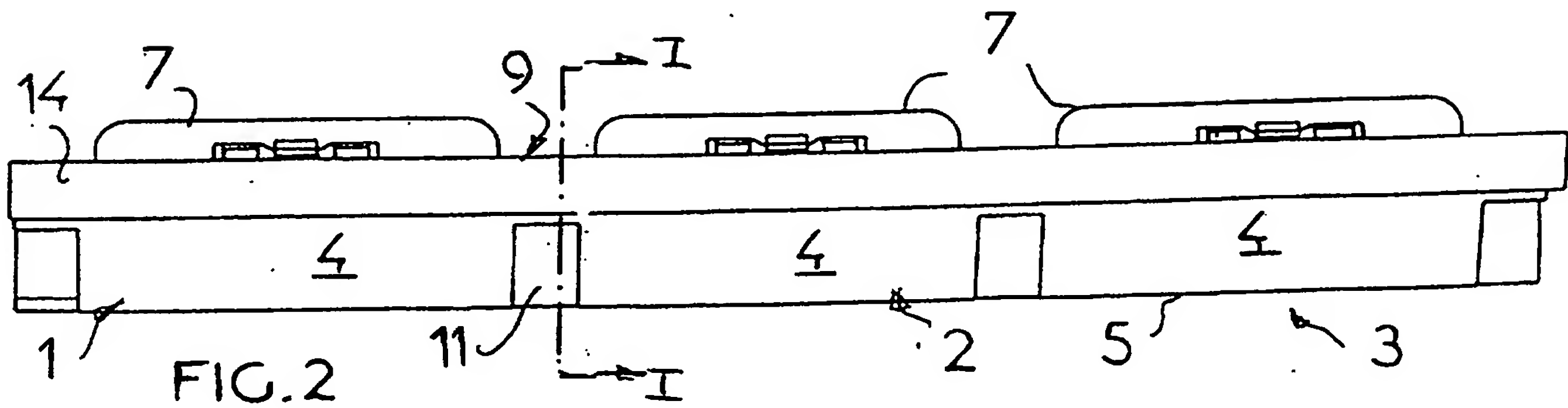
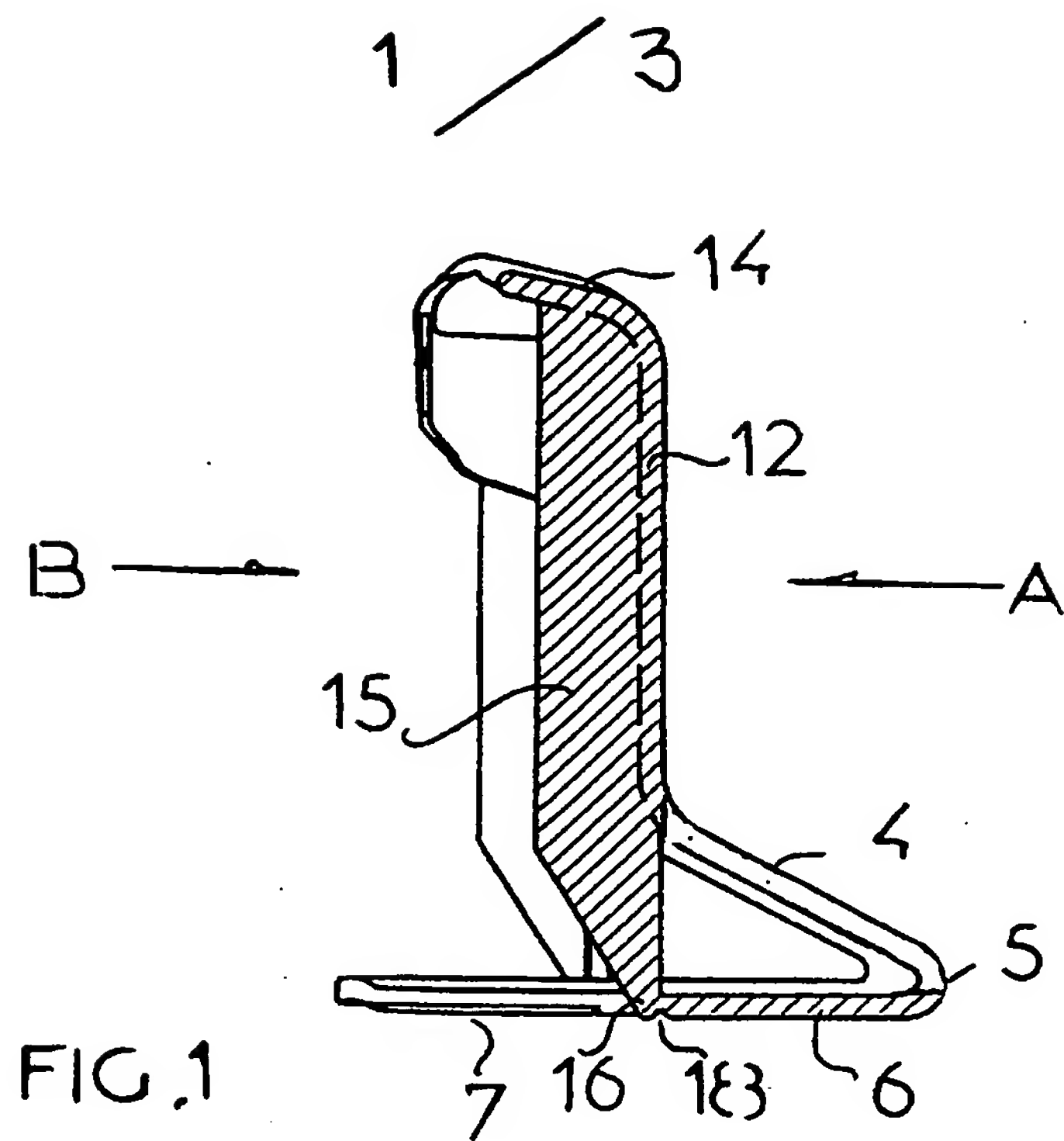
(57) A collapsible fixing for attaching a vehicle fender, wing or bonnet to a vehicle body includes three interconnected elements (1, 2, 3) each including a body portion which is generally triangular in cross-section and comprises a lengthwise extending inclined front wall (4) connected though an integral hinge (5) to a floor (6) which extends over the entire length of the fixing. An upstanding wall (12) extends upwardly beyond the upper margin of the inclined wall (4) and includes along its upper margin a lip (14) for attachment to the vehicle fender, wing or bonnet. A downwardly extending rib (15) borders one side of each inclined front wall (4) and is connected to the floor (6) along a local line of weakness (18) which shears in response to a predetermined force being applied to the fender, wing or bonnet to which the fixing is secured.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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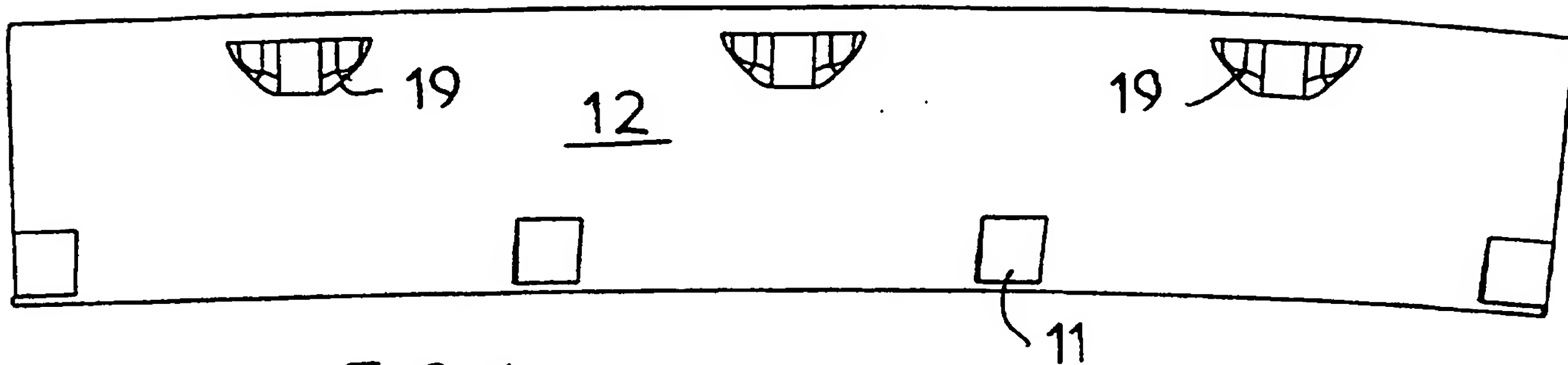


FIG. 4

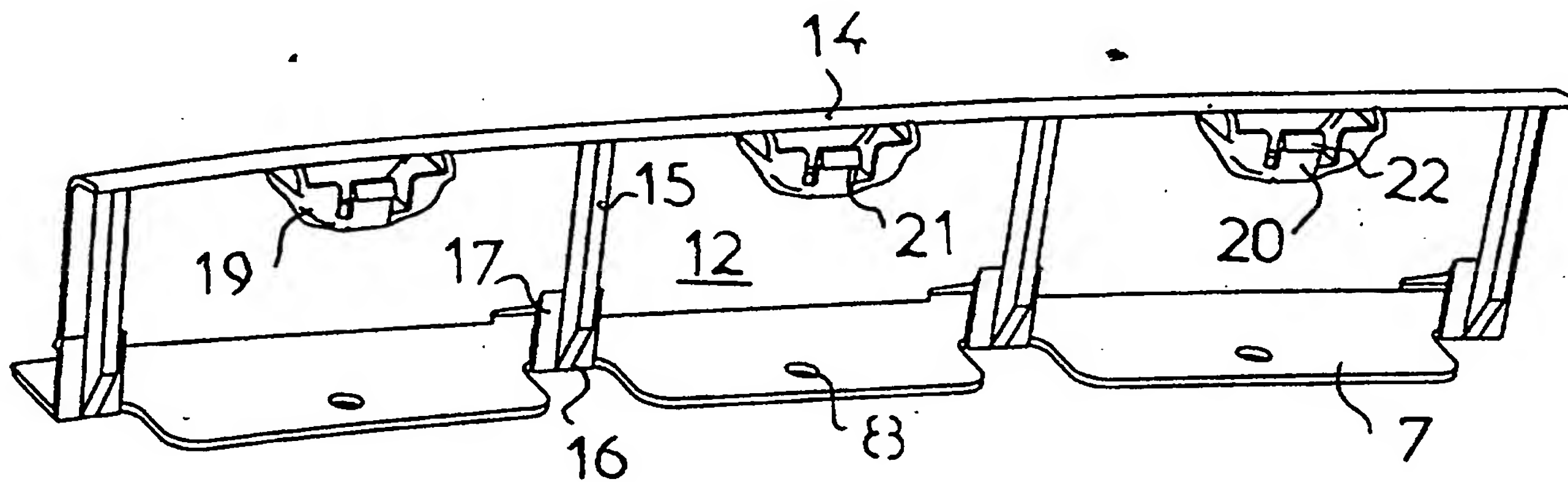


FIG. 5

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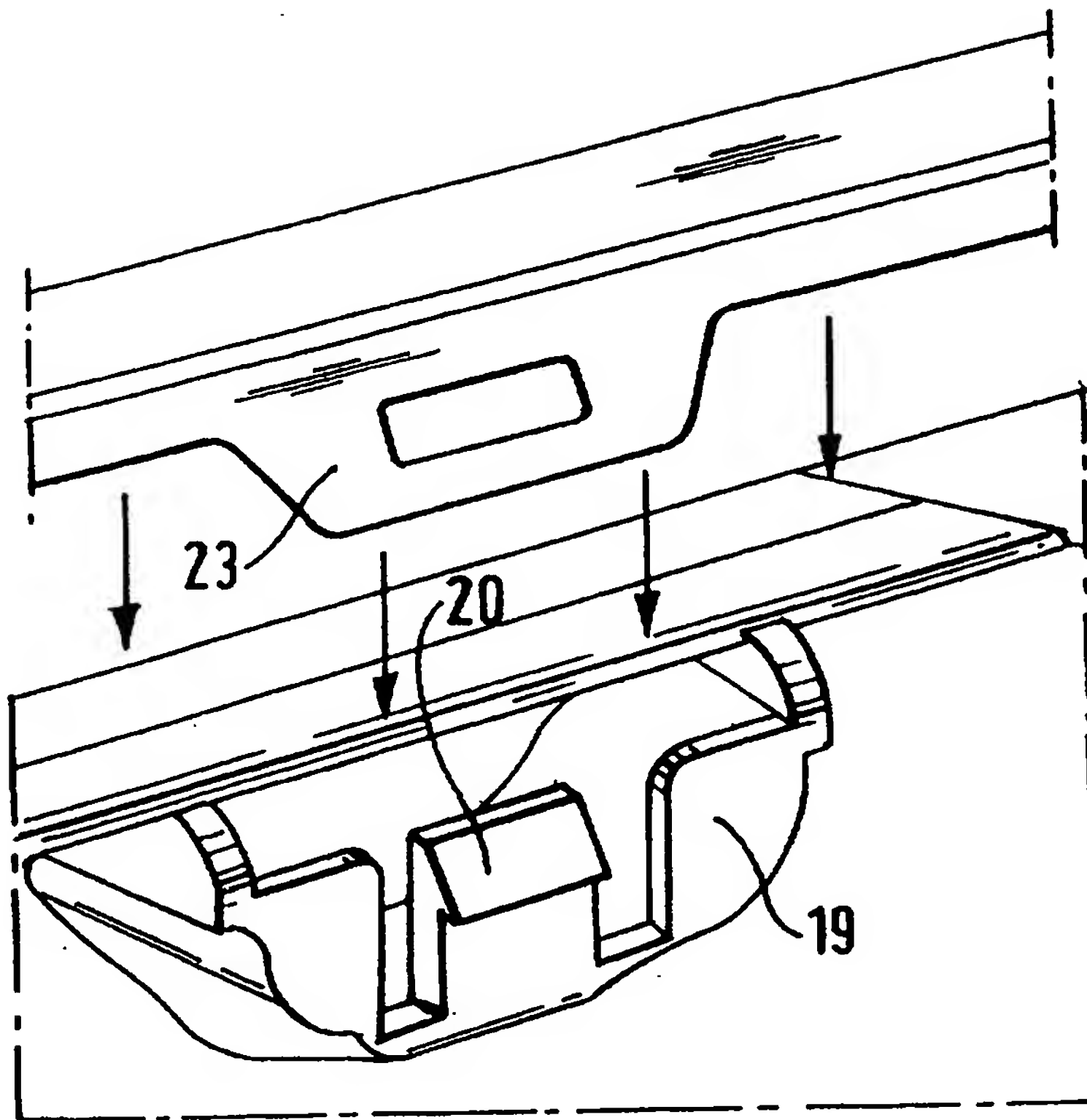


Fig.6.

**COLLAPSIBLE FIXINGS FOR ATTACHING A VEHICLE
FENDER, WING OR BONNET TO A VEHICLE BODY**

This invention relates to collapsible fixings for attaching a vehicle fender, wing or bonnet to a vehicle body.

It is known that injuries and fatalities to pedestrians and other road users caused by impact with the front structure of passenger vehicles are significant. Particular vehicle impact areas of concern are fenders, wings and bonnet upper surfaces and support structures. Accordingly, steps are being taken by governing bodies and car producers alike to reduce the effects of such impacts. An important criterion of any proposed solution is to maintain the integrity of the vehicle structure.

One previously proposed solution is disclosed in EP-A-509690. This document discloses a vehicle bonnet which is hinged at its leading edge by a mechanism which is arranged to cause the trailing edge of the bonnet to lift and the leading edge of the bonnet to move downwardly when the forward edge of the bonnet is impacted by a pedestrian during an accident.

A similar vehicle bonnet assembly is disclosed in EP-A-630801. In this document the hinge mechanism between the bonnet and the vehicle body comprises a series of links so arranged that the bonnet moves rearwardly upon impact, the links pivoting to lift the trailing edge of the bonnet and lower the leading edge.

A similar bonnet assembly is also illustrated in EP 641707. In this document the bonnet has a releasable latch adjacent its leading edge which collapses longitudinally when a load is applied thereby causing the bonnet to move rearwardly.

All of these proposed assemblies have been found to have disadvantages.

The present invention sets out to provide a collapsible fixing member for attaching

a vehicle fender, wing or bonnet to a shotgun (front rail-upper) or like vehicle body structure to cushion the impact when a pedestrian or other road user is struck by a vehicle.

According to the present invention in one aspect, there is provided a collapsible fixing for attaching a vehicle fender, wing or bonnet to a vehicle body, the fixing comprising an elongate plastics member comprising one or a plurality of interconnected elements each having a body including an inclined front wall connected through a hinge to a floor and an upstanding wall which extends upwardly beyond the upper margin of the inclined wall and includes along its upper margin a lip for attachment to a vehicle fender, wing or bonnet, and a plurality of spaced downwardly extending ribs each of which borders one side of an inclined front wall and is connected to the floor along a local line of weakness which shears in response to a predetermined force being applied to the fender, wing or bonnet to which the fixing is secured.

The fixing is preferably produced from a plastics material. Thus, the fixing may be produced from a reinforced amorphous or semi-crystalline thermoplastics material. Alternatively, the fixing may be produced from one of a plurality of thermoplastics and thermoset polymers having a range of filler and/or reinforcement levels selected according to the required physical characteristics.

The front, upstanding and floor sections are preferably formed integrally by, for example, a moulding process.

In another aspect, the invention provides a vehicle including a collapsible fixing for attaching a fender, wing or bonnet to the vehicle body, the fixing comprising a unitary elongate plastics member having a lower surface securable to a vehicle body surface and an upper surface securable to an adjoining undersurface of the vehicle's fender, wing or bonnet, an upstanding wall surface extending between the lower and upper surfaces which includes a plurality of downwardly extending ribs each positioned immediately above a complementary shaped slot formed in the said vehicle body surface, and an inclined wall surface which extends between the lower and upstanding wall surfaces of the member and is hinged to the margin of the floor surface remote from the upstanding wall, the arrangement being such that upon the fender, wing or bonnet being subjected to a

predetermined impact, the or each rib of the upstanding surface shears about a local line of weakness and moves downwardly into and through a slot formed in the vehicle body surface with the inclined surface moving downwardly towards the floor surface to impose a progressive braking force on the fender, wing or bonnet.

The upstanding wall section may extend to a height above its connection to the inclined wall surface. Preferably the or each leg extends downwardly from the connection between the upper margin of the inclined wall surface and the upstanding wall section.

The or each local line of weakness may comprise a notch formed in the underside of the floor section. The or each notch is preferably of triangular configuration and lies generally parallel to the line of connection between the floor and upstanding wall sections.

The upstanding wall section may include snap-fit connectors for receiving complementary connection pieces forming part of or attached to the fender, wing or bonnet to be connected to the vehicle body.

In a further aspect, the invention provides a collapsible fixing for attaching a vehicle fender, wing, bonnet or other vehicle part to a vehicle body, the fixing comprising one or a plurality of joined elements each comprising a body portion which is generally triangular in cross-section and includes a lengthwise extending inclined wall connected through a hinge to a floor which extends along the entire length of the fixing, the upper margin of the or each inclined wall merging with an upstanding wall which extends along the entire length of the fixing and terminates in a rearwardly extending lip, and a plurality of downwardly extending ribs which border the sides of the inclined walls and are each positioned above a weakened zone formed in the floor of the fixing.

The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is an end view in section of a collapsible fixing in accordance with the invention taken along line I-I of Figure 2;

Figure 2 is a plan view from above of the collapsible fixing illustrated in Figure 1;

Figure 3 is a plan view from below of the collapsible fixing illustrated in Figures 1 and 2;

Figure 4 is a side view of the fixing shown in Figures 1 to 3 taken in the direction of arrow A of Figure 1;

Figure 5 is a pictorial view of the collapsible fixing illustrated in Figures 1 to 3 taken generally in the direction of arrow B of Figure 1; and

Figure 6 is a detail illustrating the connection between the illustrated collapsible fixing and the vehicle fender.

The collapsible fixing illustrated in the drawings is conveniently produced from a plastics material as a single piece moulding. Typically, the fixing is produced from a reinforced amorphous or semi-crystalline thermoplastics material. Other thermoplastics or thermosetting polymers having a range of filler and/or reinforcement levels can, however, be used. As will be seen from Figures 1 to 5 of the drawings, the fixing has three interconnected elements 1, 2, 3 each including a body portion which is generally triangular in cross-section and comprises a lengthwise extending inclined front wall 4 connected through an integral hinge 5 to a floor 6 which extends over the entire length of the fixing. Each hinge 5 conveniently comprises a bend created in the moulding at the junction of the respective inclined front wall 4 and the adjoining margin of the floor 6. More or less than three interconnected elements can be employed.

As will be seen from Figures 2, 3 and 5, the floor 6 includes three rearwardly extending tabs 7 by which the fixing can be secured to a surface of the vehicle body. Each tab 7 is formed with a through-hole 8 for receiving a self-locking screw or the like and is separated from the neighbouring tab by a space 9. The number and dimensions of these tabs and through-holes may vary depending *inter alia* on the dimensions of the body surface to which the fixing is to be secured and the shape and dimensions of the member to be secured to the body via the collapsible fixing. Other means for attaching the fixing

to a selected vehicle body surface can be adopted.

Neighbouring inclined walls 4 and hinges 5 are separated by openings 11 whose positions coincide generally with the spacings 9 between the tabs 7. In the collapsible fixing illustrated, therefore, the floor 6 extends continuously along the entire fixing length with the three inclined walls and hinges of the body elements spaced one from another.

As will be seen more clearly from Figure 1, the upper margin of each inclined wall 4 merges with an upstanding wall 12 which extends over the entire length of the fixing. A rearwardly extending lip 14 extends along the upper margin of the wall 12.

As shown in Figures 1 and 5, the openings 11 of the fixing are bordered by integrally formed upstanding ribs 15 which project from the rear face of the wall 12 and extend upwardly from the margin of the floor 6 where it borders the innermost margins of the spacings 9. The ribs 15 therefore join together the floor 6, the wall 12 and the lip 14. The lower end of each rib 15 is tapered to define a generally rounded or pointed end 16. Each tapered end 16 is formed integrally with a wall piece 17 whose lower margin merges with the innermost margin of the respective spaces 9. A shallow groove 18 is formed in the undersurface of the floor 6 below each wall piece 17. These grooves 18 define weakened zones along the length of the fixing. Other species of weakened zones may be adopted.

Three snap-fit connectors 19 are positioned in the wall 12 generally midway between the ribs 15. Each connector includes a hinged flexible tooth 20 formed along its upper margin with a step 21 having an inclined face 22. As will be seen from Figure 6 of the drawings, the connectors 19 co-operate with complementary connection pieces 23 integral with the vehicle fender. A strip of pressure sensitive double-sided acrylic adhesive tape is preassembled to the upper surface of the lip 14 of the wall 12 of the fixing, the tape enabling the fixing to be adhered to the fender. The tape preferably carries a masking strip which is removed just prior to assembly. Other forms of attachment could, of course, be employed.

Apertured tabs 24 of the connection pieces 23 co-operate with flexible snap-fit

connectors 19 to lock the fender to the fixing member. As shown, when the tab is urged downwardly into the connector the riser of the respective step 21 locates within the adjoining tab aperture. Each inclined face 22 against which the leading margin of the respective connection piece engages causes the tooth member to flex about its hinge to enable the step to engage the tab aperture.

Each connector 19 includes plastics tabs to provide a snap-fit with the fender.

The fixing may be produced from one of a wide range of engineering polymers, these including thermoplastics and thermosetting polymers.

As mentioned previously, however, the fixing is preferably produced from a reinforced amorphous or semi-crystalline thermoplastics material having the required impact performance. The impact performance of the selected polymer should not deteriorate over the life of the vehicle. It is also preferable that the impact performance of the selected polymer remains substantially constant over a broad range of temperatures. Typical of such polymers are members of the CYCOLAC and NORYL GTX (registered trade marks) polymers marketed by GE Plastics.

On such assembly, the floor 6 of the fixing locates on and is secured to an upper face of the outer shotgun of the vehicle via the through-holes 8. In use, the fender is moved towards and into engagement with the lip 14, the backing strip firstly being removed from the tape to enable the fender to be attached to the lip 14. As the fender is offered to the vehicle body the apertured tabs 24 of the connection pieces 23 enter the connectors 19 until the steps 21 of the teeth members are located firmly within the apertures of the tabs 24. The fender is now secured to the plastics fixing for subsequent assembly to the motor vehicle.

Upon a predetermined impact caused by, for example, the fender striking a pedestrian, the fixing shears about the local lines of weakness 18 and folds inwardly about the hinges 5 with the ribs 15 moving downwardly through slots formed in the body surface. Movement of the fixing about the hinges imposes a progressive braking force on the fender to cushion the effect of the impact. The degree of braking force is determined *inter alia*

by the resistance applied by the hinges, and is therefore tunable for each application of the fixing.

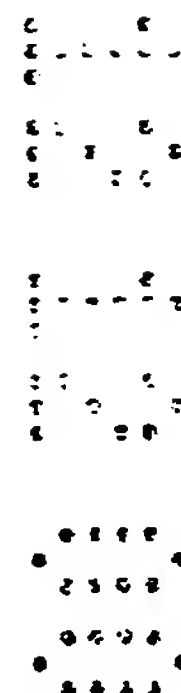
It will be appreciated that the foregoing is merely exemplary of collapsible fixings in accordance with the invention and that various modifications can readily be made thereto without departing from the true scope of the invention.

CLAIMS

1. A collapsible fixing for attaching a vehicle fender, wing or bonnet to a vehicle body, the fixing comprising an elongate member including one or a plurality of interconnected elements each having a body having an inclined front wall connected through a hinge to a floor and an upstanding wall which extends upwardly beyond the upper margin of the inclined wall and includes along its upper margin a lip for attachment to a vehicle fender, wing or bonnet, and a plurality of spaced downwardly extending ribs each of which borders one side of an inclined front wall and is connected to the floor along a local line of weakness which shears in response to a predetermined force being applied to the fender, wing or bonnet to which the fixing is secured.
2. A fixing as claimed in claim 1 produced from a plastics material.
3. A fixing as claimed in claim 2 produced from a reinforced amorphous or semi-crystalline thermoplastics material.
4. A fixing as claimed in claim 2 produced from one of a plurality of thermoplastics and thermoset polymers having a range of filler and/or reinforcement levels selected according to the required physical characteristics.
5. A fixing as claimed in any one of the preceding claims wherein the front, upstanding and floor sections are formed integrally by a moulding process.
6. A vehicle including a collapsible fixing for attaching a fender, wing or bonnet to the vehicle body, the fixing comprising a unitary elongate plastics member having a lower surface securable to a vehicle body surface and an upper surface securable to an adjoining undersurface of the vehicle's fender, wing or bonnet, an upstanding wall surface extending between the lower and upper surfaces which includes a plurality of downwardly extending ribs each positioned immediately above a complementary shaped slot formed in the said vehicle body surface, and an inclined wall surface which extends between the lower and upstanding wall surfaces of the

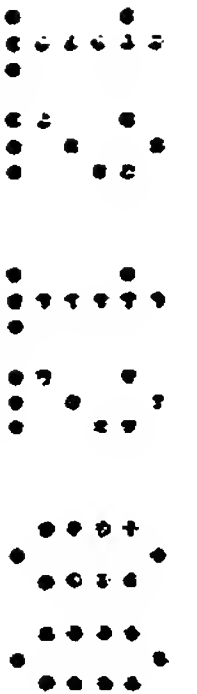
member and is hinged to the margin of the floor surface remote from the upstanding wall, the arrangement being such that upon the fender, wing or bonnet being subjected to a predetermined impact, the or each rib of the upstanding surface shears about a local line of weakness and moves downwardly into and through a slot formed in the vehicle body surface with the inclined surface moving downwardly towards the floor surface to impose a progressive braking force on the fender, wing or bonnet.

7. A vehicle as claimed in claim 6 wherein the upstanding wall section extends to a height above its connection to the inclined wall surface.
8. A vehicle as claimed in claim 6 or claim 7 wherein the or each leg extends downwardly from the connection between the upper margin of the inclined wall surface and the upstanding wall section.
9. A vehicle as claimed in any one of claims 6 to 8 wherein the or each local line of weakness comprises a notch formed in the underside of the floor section.
10. A vehicle as claimed in claim 9 wherein the or each notch is of triangular configuration and lies generally parallel to the line of connection between the floor and upstanding wall sections.
11. A vehicle as claimed in any one of claims 6 to 10 wherein the upstanding wall section includes snap-fit connectors for receiving complementary connection pieces forming part of or attached to the fender, wing or bonnet to be connected to the vehicle body.
12. A collapsible fixing for attaching a vehicle fender, wing, bonnet or other vehicle part to a vehicle body, the fixing comprising one or a plurality of joined elements each comprising a body portion which is generally triangular in cross-section and includes a lengthwise extending inclined wall connected through a hinge to a floor which extends along the entire length of the fixing, the upper margin of the or each inclined wall merging with an upstanding wall which extends along the entire



length of the fixing and terminates in a rearwardly extending lip, and a plurality of downwardly extending ribs which border the sides of the inclined walls and are each positioned above a weakened zone formed in the floor of the fixing.

13. A collapsible fixing substantially as herein described and as described in Figures 1 to 6 of the accompanying drawings.





INVESTOR IN PEOPLE

Application No: GB 0012320.8
Claims searched: 1-13

Examiner: Kevin Hewitt
Date of search: 8 March 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications; in:

UK Cl (Ed.S): B7B (BCM, BSC, BSEA, BSEM, BSES)

Int Cl (Ed.7): B60R 21/34; B62D 25/08, 25/10, 25/12, 25/16

Other: Online WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0838389 A1 (HONDA) See especially Figs.2 and 5	-
A	EP 0641707 A2 (JAGUAR) See Fig.1	-
A	US 5667271 A (BOOTH) See all Figs and abstract.	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	B	Patent document published on or after, but with priority date earlier than, the filing date of this application.